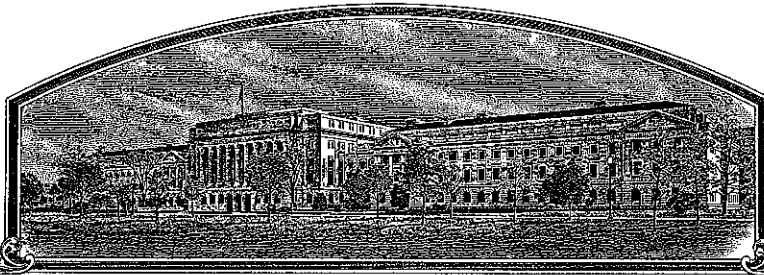


No.

200000345



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME;

Cascade International Seed Company

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

ORCHARDGRASS

'Mammoth'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this seventh day of August, in the year two thousand and six.

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture



ALL PAGE ARE
REPLACEMENT

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REPRODUCE LOCALLY. Include form number and date on all reproductions.

(1)

FORM APPROVED - OMS NO. 0681-0086

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY DIVISION - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Plant Variety Protection Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1982.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2428).

1. NAME OF APPLICANT (as it is to appear on the Certificate)

Cascade International Seed Co.

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER

CAS-EG1

3. VARIETY NAME

Mammoth

4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)

8483 W. Stayton Rd.
Aumsville, Oregon 97325

5. TELEPHONE (Include area code)

(503) 749-1822

6. FAX (Include area code)

(503) 749-1824

FOR OFFICIAL USE ONLY

PVP NUMBER

200000345

DATE

09/18/00

7. GENUS AND SPECIES NAME

Dactylis glomerata L.

8. FAMILY NAME (Optional)

Gramineae

9. CROP KIND NAME (Common name)

Orchardgrass

10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) (Common name)

Corporation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION

Oregon

12. DATE OF INCORPORATION

1986

FEES AND EXAMINATION FEE:

\$ 2705.00

DATE 09/18/00

CERTIFICATION FEE:

\$ 768.00

DATE 5/25/06

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

Chad F. Miebach
Radix Research, Inc.
9176 Bates Rd.
Aumsville, OR 97325 USA

14. TELEPHONE (Include area code)

(503) 749-1822

15. FAX (Include area code)

(503) 749-1824

16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)

- a. ☒ Exhibit A. Origin and Breeding History of the Variety
- b. ☒ Exhibit B. Statement of Distinctness
- c. ☒ Exhibit C. Objective Description of the Variety
- d. ☒ Exhibit D. Additional Description of the Variety (Optional)
- e. ☒ Exhibit E. Statement of the Basis of the Applicant's Ownership
- f. ☒ Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in an approved public repository)
- g. ☒ Filing and Examination Fee (\$2,480, made payable to "Treasurer of the United States" (Mail to PVP))

17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? (See Section 23(a) of the Plant Variety Protection Act)

☐ YES If "yes," answer Items 18 and 19 below

☒ NO If "no," go to Item 20

18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?

☐ YES ☒ NO

19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?

☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRY?

☒ YES If "yes," give points of sale and dates ☐ NO

First date of sale in U.S. - September 25, 1999

21. The applicant declares that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned applicant(s) inform(s) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) inform(s) that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT (Owner(s))

Greg Hagen

SIGNATURE OF APPLICANT (Owner(s))

NAME (Please print or type)

Greg Hagen

CAPACITY OR TITLE

General Manager, Cascade Intl.

DATE

1-23-2004

CAPACITY OR TITLE

DATE

(2)

Exhibit A revised

Mammoth (CAS-EG1) Orchardgrass (*Dactylis glomerata* L.)
Origin and Breeding History

- 1) **Genealogy:** 'Mammoth' (CAS-EG1) Orchardgrass originates from a general population improvement program at Cascade International Seed Company's breeding location in Aumsville, Oregon. 'Mammoth' traces back to seven parent clones: three collections from northern Illinois; and four selections which ultimately originate from two Plant Introduction lines out of Germany (P.I. numbers unknown).

Initial Selection: In 1991, plants from many collections in the United States; various P.I. lines; and established, commercial U.S. and European varieties were placed, in-field, in a forage Orchardgrass general population improvement program designed to evaluate, and create open-pollinated hybridizations. This initial population was reduced to 170 elite plants that were allowed to open-pollinate or self-pollinate. In 1992, open-pollinated progeny from these 170 different lines were planted and evaluated in-field for two seasons.

- 2) **Breeding Method and Subsequent Selection:** In 1994, one selection from each of the open-pollinated progeny collected in northern Illinois, and two selections each from the open-pollinated progeny tracing back to German P.I. lines were isolated, cross-pollinated and their seed harvested, by maternal lineage, as sibling F1. These sibling F1 lines were then isolated and replicated by spaced-plant rows, in-field, with alternating rows of vegetatively propagated clones from two of the plants with German P.I. lineage. This F1 generation and one subsequent generation were subject to a method of back-crossing, and recurrent phenotypic selection to produce progeny F3 Breeder seed. At this time, maternal progeny lines were bulked together with even representation by weight. The same spaced-plant progeny procedure was used for the F2 generation.

Multiplication: A portion of the Breeder seed was used to establish a four-acre, Experimental Foundation Seed Field during the fall of 1996 near Mollala, Oregon. The Experimental Foundation Seed Field was rouged to maintain integrity of plant type and to enhance uniformity of subsequent generations. All off-types and obvious variants were removed from the population during this generation.

- 3) **Evidence of Uniformity and Stability:** The F1, F2 and F3 generations of the 'Mammoth' breeding and multiplication phases have resulted in minimal and similar % of variants, and no off-types. There is one notable variant common in approximately 3% of the population with the following differences (compared to the general population): 70% 'Total Plant Height', 90% 'Leaf Length', 75% 'Leaf Width', similar 'Crown Diameter', 75% 'Panicle Length', and similar # of panicles.

This new cultivar, 'Mammoth' (CAS-EG1), was bred and selected on the basis of strong establishment, uniform maturity, seasonal growth habit and rate of activity, improved seasonal forage production and seed production, persistence to cold and drought due to high dormancy of variety, and resistance to stem rust (*Puccinia graminis*). All initial evaluation, breeding and subsequent selection work was undertaken at Cascade International Seed Company's research station in Aumsville, Oregon, USA and

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concluded during 1996. All breeding work was carried out by Cascade International Seed Company, under the direction of Chad F. Miebach, Breeder/Research Scientist.

(3)

Exhibit B revised**Mammoth (CAS-EG1) Orchardgrass (*Dactylis glomerata* L.)**

Novelty statement

Mammoth Orchardgrass is a unique cultivar bred and developed from hybridization and back-crossing methods between open-pollinated collections in northern Illinois and select, open-pollinated clones tracing back to two German P.I. lines. Mammoth most closely resembles the variety 'Boone' as it is an early-maturing variety, and has a similar, seasonal growth pattern / rate of annual activity.

Compared to Boone, with the 2 year average, **Mammoth's**:

'Total Plant Height' is 8.55 cm taller

'1st Non-contracted Internode' is 5.22 mm longer

'Leaf Width' is 1.34 mm wider - * A significant difference at 5% LSD

'Leaf Length' is 6.25 cm longer

'Panicle Length' similar being 0.14 cm longer

'Plant Width' is 2.88 cm wider

'Plant Diameter' is 3.6 cm wider - *A significant difference at 5% LSD

'Maturity date' is similar, being less than one day later to anthesis

Data File : 970GPVP

Title : 1997 Orchardgrass PVP

Variable 11 : LW (Leaf Width) 1997-2nd yr. data - mm (millimeters)

Function : RANGE

Error Mean Square = 0.3860

Error Degrees of Freedom = 30

No. of observations to calculate a mean = 3

Least Significant Difference Test

LSD value = 1.036 at alpha = 0.050

Coefficient of Variation = 6.58%

Ranked Order

Mean	1 =	11.40	A	Pennlate
Mean	3 =	10.97	AB	Rancho
Mean	13 =	10.80	ABC	Latar
Mean	16 =	10.70	ABC	Quantum (CAS-LG9)
Mean	15 =	10.70	ABC	Dawn
Mean	14 =	10.18	BCD	Bengal (CAS-MG8)
Mean	5 =	9.867	CD	Shiloh
Mean	9 =	9.450	DE	Potomac
Mean	2 =	9.317	DE	Mammoth (CAS-EG1)
Mean	4 =	8.817	EF	Hallmark
Mean	6 =	8.800	EF	Orion
Mean	7 =	8.750	EF	Dorise
Mean	8 =	8.717	EFG	Sterling
Mean	10 =	8.100	FG	Boone
Mean	12 =	7.683	GH	CAS-LG6
Mean	11 =	6.667	H	Tacs (CAS-LG10)

STATISTIX FOR WINDOWS

1997 ORCHARDGRASS PVP TRIAL

VARIABLE LW: LEAF WIDTH 1998 - 3RD YEAR DATA (MM)

LSD (T) COMPARISON OF MEANS OF LW BY ID

ID	MEAN	HOMOGENEOUS GROUPS
Latar	9.7241	A
Dawn	9.6333	A
Pennlate	9.5500	A
Rancho	8.4167	.. B
Quantum (CAS-LG9)	8.2167	.. B C
Bengal (CAS-MG8)	7.4000	.. .. C D
Potomac	7.2167	.. .. C D
Shiloh	7.2167	.. .. C D
Mammoth (CAS-EG1)	7.1333	.. ... . D
Hallmark	6.8500	.. ... . D
Sterling	6.7000	.. ... . D
Dorise	6.5667	.. ... . D E
Boone	5.6667	.. ... .. E F
Orion	5.4833	.. ... .. F
CAS-LG6	5.0000	.. ... .. F G
CAS-LG10	4.2667	.. ... .. G

THERE ARE 7 GROUPS IN WHICH THE MEANS ARE
NOT SIGNIFICANTLY DIFFERENT FROM ONE ANOTHER.

CRITICAL T VALUE	1.965
CRITICAL VALUE FOR COMPARISON (LSD)	1.0029
STANDARD ERROR FOR COMPARISON	0.5103
REJECTION LEVEL (ALPHA)	0.050

STATISTIX FOR WINDOWS

1997 ORCHARDGRASS PVP TRIAL

VARIABLE PD: PLANT DIAMETER 1998 -3RD YEAR DATA (MM)

LSD (T) COMPARISON OF MEANS OF PD BY ID

ID	MEAN	HOMOGENEOUS GROUPS
Mammoth (CAS-EG1)	254.67	A
Pennlate	244.50	A B
Latar	244.21	A B
Orion	243.97	A B
Dawn	240.73	A B
Rancho	236.83	A B C
Bengal (CAS-MG8)	234.17	A B C D
Dorise	234.00	A B C D
Hallmark	225.43	.. B C D
Quantum (CAS-LG9)	224.87	.. B C D
Shiloh	218.30	.. .. C D
Potomac	216.90	.. .. C D
Boone	214.67	.. .. D E
CAS-LG6	213.83	.. .. D E
Sterling	213.33	.. .. D E
CAS-LG10	193.00	.. .. E

THERE ARE 5 GROUPS IN WHICH THE MEANS ARE
NOT SIGNIFICANTLY DIFFERENT FROM ONE ANOTHER.

CRITICAL T VALUE	1.965
CRITICAL VALUE FOR COMPARISON (LSD)	21.677
STANDARD ERROR FOR COMPARISON	11.031
REJECTION LEVEL (ALPHA)	0.050

Data File : 970GEVP
 Title : 1997 Orchardgrass PVP

Variable 14 : PD (Plant Diameter) 1997-2nd yr. data - mm (millimeters)
 Function : RANGE

Error Mean Square = 297.1
 Error Degrees of Freedom = 30
 No. of observations to calculate a mean = 3

Least Significant Difference Test
 LSD value = 28.74 at alpha = 0.050

Coefficient of Variation = 7.33%

Ranked Order

Mean	16 =	257.5	A	Quantum (CAS-LG9)
Mean	14 =	255.7	AB	Bengal (CAS-MG8)
Mean	2 =	251.2	ABC	Mammoth (CAS-EG1)
Mean	6 =	249.0	ABC	Orion
Mean	5 =	242.5	ABCD	Shiloh
Mean	13 =	241.4	ABCD	Latar
Mean	3 =	237.5	ABCD	Rancho
Mean	15 =	234.3	ABCD	Dawn
Mean	9 =	231.8	ABCD	Potomac
Mean	11 =	228.0	BCD	Taos (CAS-LG10)
Mean	4 =	227.8	BCD	Hallmark
Mean	7 =	227.8	BCD	Dorise
Mean	1 =	225.0	CD	Pennlate
Mean	12 =	220.2	D	CAS-LG6
Mean	10 =	219.2	D	Boone
Mean	8 =	213.8	D	Sterling

STATISTIX FOR WINDOWS

2000 ORCHARDGRASS PVP TRIAL
 VARIABLE PW: PLANT WIDTH -2002 DATA (MM)

LSD (T) COMPARISON OF MEANS OF PW BY ID

ID	MEAN PW	HOMOGENEOUS GROUPS
Quantum (CAS-LG9)	1233.3	A
Rushmore (EG23)	1179.3	A B
LG31	1168.9	A B
Mammoth (CAS-EG1)	1163.7	A B
Hallmark	1136.0	A B
Potomac	1130.3	.. B
Rancho	1122.7	.. B
Justus	1118.5	.. B
Benchmark	1112.8	.. B
Boone	1101.5	.. B
Dawn	1098.2	.. B

THERE ARE 2 GROUPS IN WHICH THE MEANS ARE
 NOT SIGNIFICANTLY DIFFERENT FROM ONE ANOTHER.

CRITICAL T VALUE	1.968
CRITICAL VALUE FOR COMPARISON (LSD)	102.24
STANDARD ERROR FOR COMPARISON	51.965
REJECTION LEVEL (ALPHA)	0.050

Exhibit D Summary revised**Mammoth (CAS-EG1) Orchardgrass (*Dactylis glomerata* L.)**

1. The 1997 Orchardgrass PVP trial was located at Cascade International Seed Company's Research Facility in Aumsville, Oregon. This trial was planted in August of 1996. Plant spacing was on 2 ft. centers. Trial received 175 lbs. N during the 1997 season; and 120 lbs. N during the 1998 season. Two-year averages were used for Exhibit C – Objective Description of Variety.

Mammoth's 2-year averages are as follows:

- Total Plant Height (TPH) – 135.3 cm
- 1st Non-contracted Internode (Intnd) – 5.585 cm
- Leaf Width (LW) – 8.225 mm
- Leaf Length (LL) – 345.4 mm
- Panicle Length (PL) – 19.64 cm
- Plant Diameter (PD) – 25.29 cm

2. The 2000 Orchardgrass PVP trial:

Site Information: Radix Research, Inc. - North Farm in Aumsville, Oregon. This site is located 9 miles east of Salem on Clackamas gravelly loam.

Design: Randomized spaced-plant blocks with 3 replications of 35 plants each on 3 ft. centers. Planted in April of 2000.

Maintenance: No irrigation. Two spring applications of 45 lbs. Nitrogen (40-0-0-6) and (46-0-0) each, and one fall application of 35 lbs. Nitrogen (16-16-16) each year for the duration of the trial.

Data Analysis: 'Statistix for Windows' analytical software program.

- Plant Width (PW) – 113.1 cm - newly supplied data
- Completed Exhibit C - newly supplied data

STATISTIX FOR WINDOWS

2000 ORCHARDGRASS PVP TRIAL
 VARIABLE PW2: PLANT WIDTH -2003 DATA (MM)

LSD (T) COMPARISON OF MEANS OF PW2 BY ID

ID	MEAN PW2	HOMOGENEOUS GROUPS
Quantum (CAS-LG9)	1188.7	A
Hallmark	1127.0	A B
Rushmore (EG23)	1125.7	A B
Potomac	1122.2	A B
LG31	1120.5	A B
Rancho	1103.2	.. B
Boone	1103.0	.. B
Mammoth (CAS-EG1)	1098.3	.. B
Justus	1091.5	.. B
Dawn	1084.7	.. B
Benchmark	1078.7	.. B

THERE ARE 2 GROUPS IN WHICH THE MEANS ARE
 NOT SIGNIFICANTLY DIFFERENT FROM ONE ANOTHER.

CRITICAL T VALUE	1.968
CRITICAL VALUE FOR COMPARISON (LSD)	77.153
STANDARD ERROR FOR COMPARISON	39.215
REJECTION LEVEL (ALPHA)	0.050

Data File : 970GPVP

Title : 1997 Orchardgrass PVP

Variable 15 : 1997 Maturity Average (5=Late, 2=Early)

Function : RANGE

Error Mean Square = 0.02200

Error Degrees of Freedom = 30

No. of observations to calculate a mean = 3

Least Significant Difference Test

LSD value = 0.2473 at alpha = 0.050

Coefficient of Variation = 3.99%

Ranked Order

Mean	13 =	5.433	A	Latar
Mean	16 =	4.773	B	Quantum (CAS-LG9)
Mean	1 =	4.753	B	Pennlate
Mean	3 =	4.733	B	Rancho
Mean	15 =	4.440	C	Dawn
Mean	11 =	4.367	C	Taos (CAS-LG10)
Mean	7 =	3.747	D	Dorise
Mean	14 =	3.360	E	Bengal (CAS-MG8)
Mean	8 =	3.340	E	Sterling
Mean	6 =	3.153	EF	Orion
Mean	9 =	3.000	FG	Potomac
Mean	12 =	2.893	GH	CAS-LG6
Mean	10 =	2.847	GH	Boone
Mean	4 =	2.840	GH	Hallmark
Mean	5 =	2.780	GH	Shiloh
Mean	2 =	2.733	H	Mammoth (CAS-EG1)

Data File : 970GPVP
 Title : 1997 Orchardgrass PVP

Variable 9 : TPH (Total Plant Height) 1997-2nd yr. data - mm (millimeters)
 Function : RANGE.

Error Mean Square = 2368.
 Error Degrees of Freedom = 30
 No. of observations to calculate a mean = 3

Least Significant Difference Test
 LSD value = 81.15 at alpha = 0.050

Coefficient of Variation = 3.79%

Ranked Order

Mean	9 =	1405.	A	Potomac
Mean	1 =	1393.	AB	Pennlate
Mean	5 =	1392.	AB	Shiloh
Mean	14 =	1336.	ABC	Bengal (CAS-MG8)
Mean	3 =	1334.	ABC	Rancho
Mean	2 =	1320.	BCD	Mammoth (CAS-EG1)
Mean	15 =	1312.	BCD	Dawn
Mean	13 =	1294.	CDE	Latar
Mean	6 =	1273.	CDEF	Orion
Mean	16 =	1262.	CDEF	Quantum (CAS-LG9)
Mean	7 =	1260.	CDEF	Dorise
Mean	8 =	1255.	CDEF	Sterling
Mean	10 =	1246.	DEF	Boone
Mean	4 =	1227.	EF	Hallmark
Mean	12 =	1210.	F	CAS-LG6
Mean	11 =	1050.	G	Taos (CAS-LG10)

Data File : 970GPVP
 Title : 1997 Orchardgrass PVP

Variable 10 : 5th Internode 1997-2nd yr. data - mm (millimeters)
 Function : RANGE

Error Mean Square = 177.8
 Error Degrees of Freedom = 30
 No. of observations to calculate a mean = 3

Least Significant Difference Test
 LSD value = 22.24 at alpha = 0.050

Coefficient of Variation = 21.99%

Ranked Order

Mean	15 =	82.60	A	Dawn
Mean	6 =	75.23	AB	Orion
Mean	2 =	73.57	AB	Mammoth (CAS-EG1)
Mean	4 =	72.77	ABC	Hallmark
Mean	10 =	69.33	ABC	Boone
Mean	5 =	69.03	ABC	Shiloh
Mean	9 =	67.20	ABCD	Potomac
Mean	12 =	64.70	ABCDE	CAS-LG6
Mean	13 =	62.50	ABCDEF	Latar
Mean	14 =	53.13	BCDEF	Bengal (CAS-MG8)
Mean	1 =	51.20	CDEF	Pennlate
Mean	8 =	51.00	CDEF	Sterling
Mean	7 =	45.97	DEF	Dorise
Mean	16 =	45.87	DEF	Quantum (CAS-LG9)
Mean	3 =	43.80	EF	Rancho
Mean	11 =	42.33	F	Taos (CAS-LG10)

Data File : 970GPVP
 Title : 1997 Orchardgrass PVP

Variable 12 : LL (Leaf Length) 1997-2nd yr. data - mm (millimeters)
 Function : RANGE

Error Mean Square = 693.4
 Error Degrees of Freedom = 30
 No. of observations to calculate a mean = 3

Least Significant Difference Test
 LSD value = 43.91 at alpha = 0.050

Coefficient of Variation = 7.66%

Ranked Order

Mean	1 =	459.1	A	Pennlate
Mean	16 =	413.6	B	Quantum (CAS-LG9)
Mean	3 =	408.5	B	Rancho
Mean	15 =	408.1	B	Dawn
Mean	13 =	398.5	B	Latar
Mean	6 =	354.3	C	Orion
Mean	14 =	339.3	CD	Bengal (CAS-MG8)
Mean	5 =	337.0	CDE	Shiloh
Mean	4 =	325.6	CDEF	Hallmark
Mean	9 =	315.7	CDEFG	Potomac
Mean	2 =	314.6	CDEFG	Mammoth (CAS-EG1)
Mean	8 =	302.3	DEFGH	Sterling
Mean	7 =	294.2	EFGH	Dorise
Mean	12 =	285.2	FGH	CAS-LG6
Mean	10 =	272.2	GH	Boone
Mean	11 =	269.1	H	Taos (CAS-LG10)

Data File : 970GPVP
 Title : 1997 Orchardgrass PVP

Variable 13 : PL (Panicle Length) 1997-2ndyr. data - mm (millimeters)
 Function : RANGE

Error Mean Square = 168.7
 Error Degrees of Freedom = 30
 No. of observations to calculate a mean = 3

Least Significant Difference Test
 LSD value = 21.66 at alpha = 0.050

Coefficient of Variation = 7.05%

Ranked Order

Mean	1 =	238.2	A	Pennlate
Mean	14 =	235.1	A	Bengal (CAS-MG8)
Mean	15 =	211.7	B	Dawn
Mean	5 =	197.7	BC	Shiloh
Mean	3 =	195.0	BC	Rancho
Mean	6 =	190.4	BCD	Orion
Mean	10 =	185.7	CD	Boone
Mean	2 =	180.3	CDE	Mammoth (CAS-EG1)
Mean	4 =	179.5	CDE	Hallmark
Mean	16 =	177.1	CDE	Quantum (CAS-LG9)
Mean	8 =	176.4	CDE	Sterling
Mean	13 =	172.9	DE	Latar
Mean	9 =	171.9	DE	Potomac
Mean	7 =	163.2	EF	Dorise
Mean	12 =	146.1	FG	CAS-LG6
Mean	11 =	128.7	G	Taos (CAS-LG10)

Data File : 970GPVP
Title : 1997 Orchardgrass PVP
Variable 19 : 1998 Maturity Average

(14)

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Function : RANGE
Error Mean Square = 0.04700
Error Degrees of Freedom = 30
No. of observations to calculate a mean = 3

Least Significant Difference Test
LSD value = 0.3615 at alpha = 0.050

Coefficient of Variation = 3.52%

Ranked Order

Mean	13 =	7.311	A	Latar
Mean	3 =	7.122	AB	Rancho
Mean	16 =	7.111	AB	Quantum (CAS-LG9)
Mean	15 =	7.111	AB	Dawn
Mean	1 =	6.911	B	Pennlate
Mean	11 =	6.795	B	CAS-LG10
Mean	7 =	6.347	C	Dorise
Mean	6 =	5.922	D	Orion
Mean	14 =	5.906	D	Bengal (CAS-MG8)
Mean	8 =	5.822	D	Sterling
Mean	12 =	5.789	D	CAS-LG6
Mean	9 =	5.415	E	Potomac
Mean	4 =	5.411	E	Hallmark
Mean	10 =	5.256	E	Boone
Mean	2 =	5.200	E	Mammoth (CAS-EG1)
Mean	5 =	5.133	E	Shiloh

STATISTIX FOR WINDOWS

1997 ORCHARDGRASS PVP TRIAL

VARIABLE TPH: TOTAL PLANT HEIGHT 1998 - 3RD YEAR DATA (MM)

LSD (T) COMPARISON OF MEANS OF TPH BY ID

ID	MEAN TPH	HOMOGENEOUS GROUPS
Pennlate	1405.7	A
Potomac	1399.0	A B
Shiloh	1398.2	A B
Mammoth (CAS-EG1)	1385.2	A B
Bengal (CAS-MG8)	1377.5	A B C
Rancho	1360.2	A B C
Dawn	1340.0	.. B C D
Hallmark	1317.1	... C D E
Latar	1297.2	.... D E
Boone	1288.0	.... D E
Sterling	1284.3	.... D E
Orion	1269.7	.... .. E F
Quantum (CAS-LG9)	1258.5	.... .. E F G
CAS-LG6	1208.4	.... .. F G
Dorise	1205.5	.... .. G
CAS-LG10	1004.1	.... .. H

CRITICAL T VALUE	1.965
CRITICAL VALUE FOR COMPARISON (LSD)	63.643
STANDARD ERROR FOR COMPARISON	31.878
REJECTED LEVEL (ALPHA)	0.050

STATISTIX FOR WINDOWS

1997 ORCHARDGRASS PVP TRIAL

VARIABLE INTND: 5TH INTERNODE 1998 - 3RD YEAR DATA (MM).

LSD (T) COMPARISON OF MEANS OF INTND BY ID

ID	MEAN	HOMOGENEOUS GROUPS
Bengal (CAS-MG8)	63.633	A
Quantum (CAS-LG9)	58.633	A
Latar	52.467	A B
Pennlate	41.467	.. B C
Potomac	39.867	.. B C
Dawn	39.300	.. B C
Hallmark	38.200	.. B C
Mammoth (CAS-EG1)	38.133	.. B C
CAS-LG6	38.033	.. B C
Dorise	33.667	.. .. C
Rancho	31.967	.. .. C
Boone	31.933	.. .. C
Orion	31.767	.. .. C
Shiloh	31.033	.. .. C
CAS-LG10	28.367	.. .. C
Sterling	27.033	.. .. C

THERE ARE 3 GROUPS IN WHICH THE MEANS ARE
NOT SIGNIFICANTLY DIFFERENT FROM ONE ANOTHER.

CRITICAL T VALUE	1.965
CRITICAL VALUE FOR COMPARSON (LSD)	15.073
STANDARD ERROR FOR COMPARISON	7.6705
REJECTION LEVEL (ALPHA)	0.050

STATISTIX FOR WINDOWS

1997 ORCHARDGRASS PVP TRIAL

VARIABLE LL: LEAF LENGTH 1998 -3RD YEAR DATA (MM)

LSD (T) COMPARISON OF MEANS OF LL BY ID

ID	MEAN	HOMOGENEOUS GROUPS
Pennlate	389.63	A
Hallmark	382.73	A
Potomac	379.67	A
Mammoth (CAS-EG1)	376.10	A
Latar	371.90	A B
Shiloh	367.77	A B
Dawn	367.67	A B
Rancho	366.37	A B
Quantum (CAS-LG9)	360.40	A B
Orion	331.13	.. B C
Bengal (CAS-MG8)	330.00	.. B C
CAS-LG6	308.93	... . C
Sterling	307.57	... . C
Dorise	304.60	... . C
Boone	293.53	... . C
CAS-LG10	204.53	... . . D

THERE ARE 4 GROUPS WHICH THE MEANS ARE
NOT SIGNIFICANTLY DIFFERENT FROM ONE ANOTHER.

CRITICAL T VALUE	1.965
CRITICAL VALUE FOR COMPARISON (LSD)	43.087
STANDARD VALUE FOR COMPARISON	21.926
REJECTION LEVEL (ALPHA)	0.050

STATISTIX FOR WINDOWS

1997 ORCHARDGRASS PVP TRIAL

VARIABLE PL: PANICLE LENGTH 1998 - 3RD YEAR DATA (MM)

LSD (T) COMPARISON OF MEANS OF PL BY ID

ID	MEAN	HOMOGENEOUS GROUPS
Pennlate	236.4	A
Mammoth (CAS-EG1)	212.43	A B
Boone	209.83	A B C
Bengal (CAS-MG8)	209	A B C
Hallmark	195.57	.. B C D
Shiloh	193.83	.. B C D
Rancho	193	.. B C D
Orion	190.57	.. B C D
Dawn	185.6	.. B C D E
Latar	184.17	.. .. C D E
Quantum (CAS-LG9)	179.17	.. .. .. D E
Potomac	173.87	.. .. .. D E
Sterling	168.93	.. .. .. D E
Dorise	161.1	.. .. .. E
CAS-LG6	157.5	.. .. .. E F
CAS-LG10	129.8	.. .. .. F

THERE ARE 6 GROUPS IN WHICH THE MEANS ARE
NOT SIGNIFICANTLY DIFFERENT FROM ONE ANOTHER.

CRITICAL T VALUE	1.965
CRITICAL VALUE FOR COMPARISON (LSD)	28.265
STANDARD ERROR FOR COMPARISON	14.384
REJECTION LEVEL (ALPHA)	0.05

U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
COMMODITIES SCIENTIFIC SUPPORT DIVISION
BELTSVILLE, MARYLAND 20705
OBJECTIVE DESCRIPTION OF VARIETY
ORCHARDGRASS
(*Dactylis glomerata* L.)

NAME OF APPLICANT(S) Cascade International Seed Company	VARIETY NAME OR TEMPORARY DESIGNATION Mammoth (CAS-EG1)
ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code) 8483 W. Stayton Rd. Aumsville, Oregon 97325	FOR OFFICIAL USE ONLY PVPO NUMBER 200000345

Place the appropriate number that describes the varietal character of this variety in the boxes below. Fill unused columns with zeroes (e.g. 0 9 9 when number is 99). In comparisons to Potomac (standard variety) be sure to strike out the comparative term which does not apply (e.g. (shorter) (longer)); the value 0 0 should only be used to indicate that the varieties are equal. The symbol Δ indicates a decimal point. Characteristics described, including numerical measurements, should represent those which are TYPICAL for the variety. Measured data should be for SPACED PLANTS. Any recognized color fan, e.g. Royal Horticultural Colour Chart, may be used to determine plant colors; designate system used: . Give location of test area Aumsville, OR. Ranges of values are valuable and may be included with additional description elsewhere in the application.

NOTE: FOR SINGLE PLANT DATA A MINIMUM OF 100 PLANTS IS SUGGESTED.

1. FLOIDY:

<u>2</u> 1 - DIPLOID (2N = 14)	2 - TETRAPLOID (2N = 28)	3 - OTHER (Specify) _____
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2. ADAPTATION (for forage or pasture):

<u>4</u> 1 - NORTHEAST	2 - EAST CENTRAL	3 - SOUTHEAST	4 - NORTH CENTRAL
5 - SOUTH CENTRAL	6 - PACIFIC NW.	7 - SOUTHWEST	8 - OTHER (Specify) _____

3. WINTER HARDINESS:

<u>7</u> 1 - TENDER (HALLMARK)	5 - INTERMEDIATE (PENNLATE)	7 - HARDY (CHINOOK)
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4. MATURITY:

<u>1</u> SEASON:	1 - VERY EARLY (BOONE)	2 - EARLY (STERLING)	3 - MIDSEASON (PENNMED)
	4 - LATE (PENNLATE)	5 - VERY LATE (MASSHARDY)	

FLOWERING DATE (50% BLOOM) COMPARED TO POTOMAC . . .	<u>0 2</u>	DAYS (EARLIER) (LATER)
BEGINNING OF SPRING GROWTH COMPARED TO POTOMAC . . .	<u>0 7</u>	DAYS (EARLIER) (LATER)

5. PLANT HEIGHT (From soil level to top of panicle):

<u>1 35.3</u> CM. TALL; COMPARED TO POTOMAC	<u>4.9</u> CM. (SHORTER) (TALLER)
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6. PLANT GROWTH TYPE (at maturity):

<u>3</u> TYPE:	1 - PROSTRATE (S-143)	2 - INTERMEDIATE (PENNMED)	3 - ERECT (BOONE)
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PLANT WIDTH: DIAMETER ACROSS 2ND YEAR PLANT (TO TIPS OF OPPOSITE PANICLES). USE SAME OR COMPARABLE PLANTS AS FOR PLANT HEIGHT.

<u>11 3 .3</u> CM. PLANT WIDTH; COMPARED TO POTOMAC	<u>0 .7</u> CM. (NARROWER) (WIDER)
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1. EARLY LEAFINESS:

1 - PANICLE TILLERS EXERTED BEFORE BARREN TILLERS	2 - PANICLE AND BARREN TILLERS EXERTED TOGETHER
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<u>1 2 6</u>	NO. PANICLE TILLERS AT MATURITY
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<u>3 4</u>	NO. BARREN TILLERS AT MATURITY
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LEAF ELEVATION DATA: (USE SAME OR COMPARABLE PLANTS FOR BOTH CHARACTERS)

<u>5.59</u> CM. LENGTH OF 5TH INTERNODE BELOW PANICLE (USUALLY 1ST NONCONTRACTED INTERNODE)

<u>115.7</u> CM. TOTAL STRAW LENGTH (TO LOWEST BRANCH OF PANICLE)

7. LEAF:

<input type="text" value="1"/>	CULM LEAF ATTITUDE (AT EARLY BOOT):	1 = ERECT (ORBIT)	2 = DROOPING (POTOMAC)
<input type="text" value="3"/>	LEAF COLOR:	1 = YELLOW GREEN (LATAR)	2 = GREEN (STERLING) 3 = DARK GREEN (POTOMAC)
		4 = BLUE GREEN (SUMAS)	

LEAF HAIRINESS (% PLANTS WITH EACH SURFACE):

<input type="text" value="0"/> <input type="text" value="9"/> <input type="text" value="2"/>	% GLABROUS	<input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="8"/>	% SLIGHTLY PUBESCENT	<input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="0"/>	% PUBESCENT
<input type="text" value="8"/> <input type="text" value="23"/>	MM. WIDTH (FIRST LEAF BLADE BELOW FLAG LEAF); COMPARED TO POTOMAC	<input type="text" value="0"/> <input type="text" value="1"/>	MM. (NARROWER) (LONGER)		
<input type="text" value="3"/> <input type="text" value="45"/> <input type="text" value="4"/>	MM. LENGTH (FIRST LEAF BLADE BELOW FLAG LEAF); COMPARED TO POTOMAC	<input type="text" value="2"/> <input type="text" value="29"/>	MM. (SHORTER) (LONGER)		

8. PANICLE: (from lowest panicle branch to tip of rachis):

<input type="text" value="19"/> <input type="text" value="6"/>	CM. PANICLE LENGTH; COMPARED TO POTOMAC	<input type="text" value="2"/> <input type="text" value="35"/>	CM. (SHORTER) (LONGER)
<input type="text" value="0"/> <input type="text" value="5"/>	NO. PRIMARY BRANCHES	<input type="text" value="0"/> <input type="text" value="3"/>	NO. SPIKELETS OF LOWEST GLOMERULE (SPIKELET CLUSTER)
<input type="text" value="2"/>	CAST (SECONDARY COLOR) OF PANICLE: 1 - YELLOWISH 2 - BROWN 3 - PURPLE 4 - OTHER (Specify)		

PANICLE TYPE: IN THE TABLE BELOW GIVE PERCENTAGE OF PLANTS WITH EACH PANICLE TYPE. PANICLE TYPE IS DETERMINED BY THE ANGLES FROM THE VERTICAL FORMED BY (A) THE RACHIS TIP AND (B) THE LOWEST BRANCH.

(A) ANGLE OF RACHIS TIP (FROM VERTICAL)

		0° (ERECT)	< 45°	> 45°
(B) ANGLE OF LOWEST BRANCH (FROM VERTICAL)	(< 30°)	9%		
	(30° - 90°)	91%		
	(> 90°)	0%		

9. LEMMA (first spikelet of lowest cluster):

LEMMA HAIRINESS (% PLANTS WITH EACH SURFACE):

<input type="text" value="0"/> <input type="text" value="8"/> <input type="text" value="5"/>	% GLABROUS	<input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="5"/>	% PUBESCENT
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LEMMA KEEL HAIRINESS (% PLANTS WITH EACH SURFACE):

<input type="text" value="0"/> <input type="text" value="5"/> <input type="text" value="0"/>	% GLABROUS	<input type="text" value="0"/> <input type="text" value="5"/> <input type="text" value="0"/>	% CILIATE
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<input type="text" value="0"/> <input type="text" value="9"/> <input type="text" value="8"/>	% PLANTS WITH NOTCHED LEMMA APEX
<input type="text" value="0"/> <input type="text" value="9"/> <input type="text" value="6"/>	% PLANTS WITH LEMMA AWNS

<input type="text" value="0"/> <input type="text" value="5"/> <input type="text" value="5"/>	MM. DEPTH APICAL NOTCH
<input type="text" value="1"/> <input type="text" value="1"/> <input type="text" value="0"/>	MM. TYPICAL AWN LENGTH

10. SEED:

<input type="text" value="1"/> <input type="text" value="4"/> <input type="text" value="1"/>	MM. WIDTH; COMPARED TO POTOMAC	<input type="text" value="0"/> <input type="text" value="6"/>	MM. (NARROWER) (WIDER)
<input type="text" value="8"/> <input type="text" value="1"/> <input type="text" value="0"/>	MM. LENGTH; COMPARED TO POTOMAC	<input type="text" value="0"/> <input type="text" value="3"/>	MM. (SHORTER) (LONGER)
<input type="text" value="1"/> <input type="text" value="4"/> <input type="text" value="00"/>	MG. PER 1,000 PURE SEED; COMPARED TO POTOMAC	<input type="text" value="2"/> <input type="text" value="0"/>	MG. (LIGHTER) (HEAVIER)

11. DISEASE AND INSECT RESISTANCE (rate resistance 0-9, Where 0 = not tested, 1 = 100% susceptible, and 9 = 100% resistant):

<input type="text" value="5"/>	POWDERY MILDEW (<u>ERYSIPHE GRAMINIS</u>)	<input type="text" value="0"/>	STRIPE SMUT (<u>USTILAGO STRIIFORMIS</u>)
<input type="text" value="0"/>	ANTHRACNOSE (<u>COLLETOTRICHUM GRAMINICOLA</u>)		
<input type="text" value=""/>	OTHER (Specify) _____		

11. DISEASE AND INSECT RESISTANCE (Continued)

RUST AND LEAF SPOT: SPECIFY AS COMPLETELY AS POSSIBLE INCLUDING SPECIES AND RACES WHERE KNOWN. IF GENERALIZED RESISTANCE OR SUSCEPTIBILITY IS CLAIMED (FIRST BOX), INCLUDE OR APPEND EXPLANATION. (0 = NOT TESTED, 1-9 = 100% SUSCEPTIBLE TO 100% RESISTANT, RESPECTIVELY.

COMMENTS:

	RUST
7	STEM RUST (<u>PUCCINIA GRAMINIS</u>)
6	CROWN RUST (<u>P. CORONATA</u>)
0	LEAF RUST (<u>P. RUBIGO-VERA</u>)
0	STRIPE RUST (<u>P. GLUMARUM</u>)

COMMENTS:

0	LEAF SPOT
	LEAF STREAK (<u>SCOLECOTRICHUM GRAMINIS</u>)
	LEAF BLOTCH (<u>STAGONOSPORA ARENARIA</u>)
	PURPLE LEAF SPOT (<u>STAGONOSPORA MACULATA</u>)
	SCALD (<u>RHYNCHOSPORIUM ORTHOSPORIUM</u>)
	LEAF SPOT (<u>ASCOCHYTA GRAMINICOLA</u>)
	LEAF SPOT (<u>MASTIGOSPORIUM RUBICOSUM</u>)
	LEAF SPOT (<u>HELMINTHOSPORIUM SPP.</u>)
	LEAF SPOT (<u>SEPTORIA SPP.</u>)
	OTHER

12. INDICATE THE VARIETY THAT MOST CLOSELY RESEMBLES THE APPLICATION VARIETY FOR THE FOLLOWING CHARACTERS:

CHARACTER	VARIETY	CHARACTER	VARIETY
LEAFINESS	Boone	SEEDLING VIGOR	Boone
WINTER HARDINESS	Dawn	SEED SIZE	Potomac
FROST RESISTANCE	Benchmark	% LIGNIN	?
SUMMER DORMANCY	Boone	PERSISTENCE	Boone
HEAT TOLERANCE	Boone	TILLERING	Orion

REFERENCES:

R. G. STAPLEDON, COCKSFOOT GRASS (DACTYLIS GLOMERATA L.) ECOTYPES IN RELATION TO THE BIOTIC FACTORS. JOURNAL OF ECOLOGY 16:71-104 1928.

P.F. PARKER, GENETIC VARIATION IN DIPLOID DACTYLIS III PANICLE, SPIKELET AND FLORET CHARACTERS. HEREDITY 24:383-405 1969.

COMMENTS:

REPRODUCE LOCALLY. Include form number and date on all reproductions.

FORM APPROVED - OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) Cascade International Seed Co.	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER CAS-EG1	3. VARIETY NAME Mammoth
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) 8483 W. Stayton Rd. Aumsville, Oregon 97325	5. TELEPHONE (include area code) (503) 749-1822	6. FAX (include area code) (503) 749-1824
7. PVPO NUMBER 200000345		
8. Does the applicant own all rights to the variety? Mark an "X" in appropriate block. If no, please explain. <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
9. Is the applicant (individual or company) a U.S. national or U.S. based company? If no, give name of country <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
10. Is the applicant the original owner? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO If no, please answer the following: a. If original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. national(s)? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO If no, give name of country b. If original rights to variety were owned by a company, is the original owner(s) a U.S. based company? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO If no, give name of country 11. Additional explanation on ownership (If needed, use reverse for extra space):		

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definition.

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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